

Floating Seal for Turbopumps, Phase I

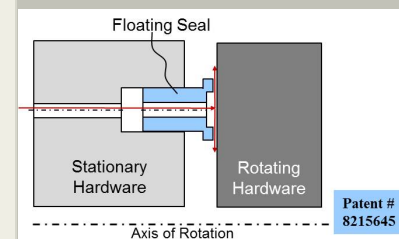
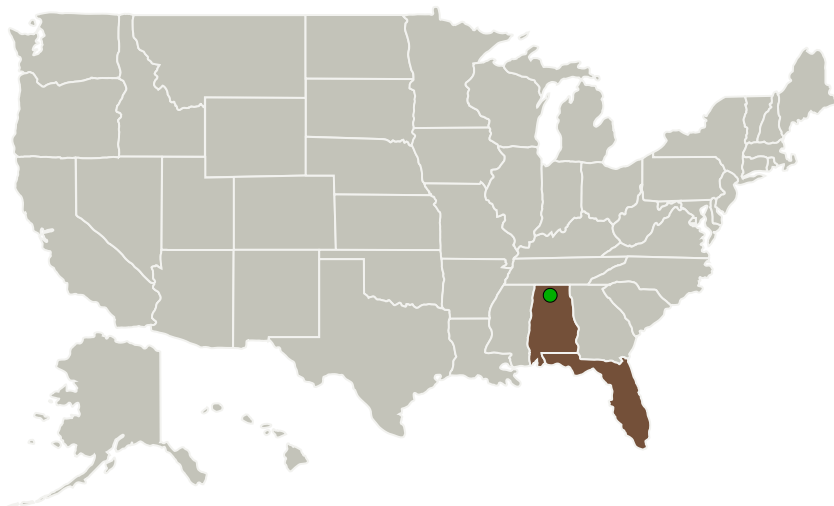
Completed Technology Project (2013 - 2013)



Project Introduction

Cryogenic engines for in-space propulsion require innovative technologies to provide long-life, lightweight, and reliable turbopump designs. One area open for improvement is seals for rotating-to-static hardware. Florida Turbine Technologies, Inc. (FTT) is proposing the use of a floating seal for turbopump applications. The floating seal would allow lower leakages than current state-of-the-art seals, such as labyrinth seals. The floating seal also has the added benefit of maintaining low leakages throughout transients and rotor displacements, since the floating seal's clearance tracks with the rotor axial movement and is independent of radial movement. Plus, the floating seal is a non-contacting seal with high pressure and speed capability; this increases its reliability relative to contacting face seals or labyrinth seals operating at the same conditions and leakages. The floating seal is proposed to work with the cryogenic liquid propellants used in upper stage engines, liquid hydrogen and liquid oxygen. The feasibility of the floating seal for turbopump applications will be determined through detailed 3D computational fluid dynamics (CFD) analyses. 1D parametric studies to vary the seal geometry and boundary conditions will also be performed. The concerns of axial instability and increased turbopump axial length will be addressed during Phase I.

Primary U.S. Work Locations and Key Partners



Floating Seal For Turbopumps

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Organizations Performing Work	Role	Type	Location
Florida Turbine Technologies, Inc.	Lead Organization	Industry	Jupiter, Florida
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

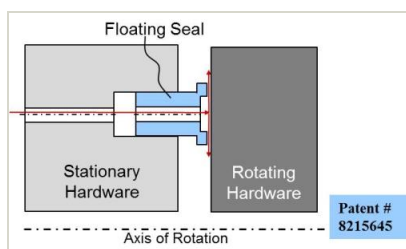
Primary U.S. Work Locations	
Alabama	Florida

Project Transitions

**May 2013:** Project Start**November 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138172>)

Images

**Project Image**

Floating Seal For Turbopumps
(<https://techport.nasa.gov/image/133415>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Florida Turbine Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

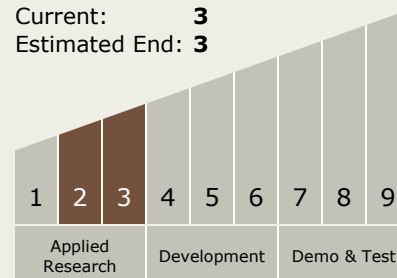
Carlos Torrez

Principal Investigator:

Ken Head

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.3 Cryogenic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System